

WHAT IS CLAIMED IS:

1. A microlens device, comprising:
a substrate having a photo sensor located therein;
a microlens located over the substrate and including a substantially convex portion substantially aligned over the photo sensor;
a dielectric film located over and conforming to the microlens; and
a protective layer located over the dielectric film.
2. The microlens device of claim 1 further comprising a dielectric layer interposing the microlens and the substrate.
3. The microlens device of claim 1 wherein the dielectric film comprises a first composition and the microlens comprises a second composition that is substantially similar to the first composition.
4. The microlens device of claim 1 wherein the dielectric film has a first refractive index and the microlens has a second refractive index different than the first refractive index.
5. The microlens device of claim 1 wherein the dielectric film is an anti-reflective film.
6. The microlens device of claim 1 wherein the microlens comprises a polymer material.
7. The microlens device of claim 1 wherein the microlens comprises a dielectric material.
8. The microlens device of claim 1 further comprising a color filter layer located over the protective layer.

9. The microlens device of claim 1 wherein a fill factor corresponding to a ratio of light incident on the microlens device and the photo sensor is at least about 50%.

10. A microlens array, comprising:
a substrate having a plurality of photo sensors located therein;
a microlens layer comprising a plurality of microlenses located over the substrate, each of the plurality of microlenses including a substantially convex portion substantially aligned over a corresponding one of the plurality of photo sensors, wherein the plurality of microlenses are separated by a plurality of gaps; and
a dielectric film located over and conforming to the microlens layer and substantially filling the plurality of gaps.

11. The microlens array of claim 10 further comprising a protective layer located over the dielectric film.

12. The microlens array of claim 10 further comprising a dielectric layer interposing the microlens layer and the substrate.

13. The microlens array of claim 10 wherein the dielectric film comprises a first composition and the microlens layer comprises a second composition that is substantially similar to the first composition.

14. The microlens array of claim 10 wherein the dielectric film has a first refractive index and the microlens layer has a second refractive index different than the first refractive index.

15. The microlens array of claim 10 wherein the dielectric film is an anti-reflective film.

16. The microlens array of claim 10 wherein the microlens layer comprises a polymer material.

17. The microlens array of claim 10 wherein the microlens layer comprises a dielectric material.
18. The microlens array of claim 10 further comprising:
a protective layer located over the dielectric film; and
a color filter layer located over the protective layer.
19. The microlens array of claim 10 wherein a fill factor corresponding to a ratio of light incident on the microlens array and the plurality of photo sensors is at least about 50%.
20. A method of manufacturing a microlens array, comprising:
providing a substrate having a plurality of photo sensors located therein;
forming a microlens layer comprising a plurality of microlenses over the substrate, each of the plurality of microlenses including a substantially convex portion substantially aligned over a corresponding one of the plurality of photo sensors, wherein the plurality of microlenses are separated by a plurality of gaps; and
forming a dielectric film over and conforming to the microlens layer and substantially filling the plurality of gaps.
21. The method of claim 20 further comprising forming a protective layer over the dielectric film.
22. The method of claim 20 further comprising forming a dielectric layer interposing the microlens layer and the substrate.
23. The method of claim 22 wherein forming the microlens layer comprises:
depositing a microlens material layer over the dielectric layer;
patterning the microlens material layer; and
heating the patterned microlens material layer to form the plurality of microlenses.

24. The method of claim 23 wherein the microlens material layer comprises a polymer material.

25. The method of claim 20 wherein forming the microlens layer comprises:
depositing a microlens material layer over the substrate;
forming a mask over the microlens material layer; and
etching the microlens material layer employing the mask.

26. The method of claim 25 wherein the microlens material layer comprises a dielectric material.

27. The method of claim 20 further comprising:
forming a protective layer over the dielectric film; and
forming a color filter layer over the protective layer.